

Spatio-Temporal Analysis and Mapping of Malaria in Thailand

Authors : Krisada Lekdee, Sunee Sammatat, Nittaya Boonsit

Abstract : This paper proposes a GLMM with spatial and temporal effects for malaria data in Thailand. A Bayesian method is used for parameter estimation via Gibbs sampling MCMC. A conditional autoregressive (CAR) model is assumed to present the spatial effects. The temporal correlation is presented through the covariance matrix of the random effects. The malaria quarterly data have been extracted from the Bureau of Epidemiology, Ministry of Public Health of Thailand. The factors considered are rainfall and temperature. The result shows that rainfall and temperature are positively related to the malaria morbidity rate. The posterior means of the estimated morbidity rates are used to construct the malaria maps. The top 5 highest morbidity rates (per 100,000 population) are in Trat (Q3, 111.70), Chiang Mai (Q3, 104.70), Narathiwat (Q4, 97.69), Chiang Mai (Q2, 88.51), and Chanthaburi (Q3, 86.82). According to the DIC criterion, the proposed model has a better performance than the GLMM with spatial effects but without temporal terms.

Keywords : Bayesian method, generalized linear mixed model (GLMM), malaria, spatial effects, temporal correlation

Conference Title : ICORS 2014 : International Conference on Operations Research and Statistics

Conference Location : Zurich, Switzerland

Conference Dates : July 30-31, 2014